**Coexistence of superconductivity and ferromagnetism at low-dimensional heterostructures**

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**Abstract**

Investigation of superconducting / ferromagnetic low-dimensional heterostructures by polarized neutron reflectometry with secondary radiation registration.

**Tasks**

1. Understanding of scientific problem

2. Processing of raw-data spectra with Spectra\_Viewer software

3. Data fitting with physical model by Matlab software

4. Calculation of modeling reflectivity curve depending on different parameters

**Preliminary schedule by topics/tasks**

The duration of this project is 6 weeks.

Week 1 – introduction lecture, reading the articles

Week 2 – lecture with task explanation

Week 3, 4 - task completion

Week 5, 6 – preparing of the report

**Required skills**

1. Condensed matter physics: basic knowledge of magnetism / superconductivity

2. Neutron physics: basic knowledge of polarized neutron reflectometry

3. Computer skills: Matlab

**Acquired skills and experience**

1. Understanding the problems of coexistence superconductivity / ferromagnetism at low-dimensional heterostructures

2. Skills at polarized neutron reflectometry (PNR)

3. Understanding of possible directions of PNR development: isotope-identifying neutron reflectometry, etc.

4. Experience at data processing and fitting of data with physical model.

**Recommended literature**

1. Yu N Khaydukov, EA Kravtsov, VD Zhaketov, et al. Magnetic proximity effect in Nb/Gd superlattices seen by neutron reflectometry // Physical Review B, Vol. 99, No. 14, pp. 140503, 2019.

2. V.L. Aksenov, K.N. Jernenkov, S.V. Kozhevnikov, H. Lauter, V. Lauter-Pasyuk, Yu.V. Nikitenko, A.V. Petrenko, The polarized neutron spectrometer REMUR at the pulsed reactor IBR-2 // JINR Communications D13-2004-47 (2004).